

FAMILY TIES AND ORGANIZATIONAL DESIGN: EVIDENCE FROM CHINESE PRIVATE FIRMS

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Abstract—Analyzing data from a unique survey of managers of Chinese private firms, we investigate how family ties with firm heads affect managerial compensation and job assignment. We find that family managers earn higher salaries and receive more bonuses, hold higher positions, and are given more decision rights and job responsibilities than nonfamily managers in the same firm. However, family managers face weaker incentives than professional managers, as seen in the lower sensitivity of their bonuses to firm performance. Our findings are consistent with the predictions of a principal-agent model that incorporates family trust and endogenous job assignment decisions.

I. Introduction

FAMILY firms are estimated to account for 65% to 80% of all businesses worldwide (Gersick et al., 1997). In many developing countries, family firms have been a major mobilizer of capital, entrepreneurship, and employment. In modern China, private enterprises did not gain legal status until the late 1980s but since then have flourished, now accounting for nearly 60% of industrial firms and one-third of industrial employment (National Bureau of Statistics, 2010).¹ As evidenced from our surveys of private firms described below, the vast majority of China's private businesses are family firms, defined as those in which key managerial roles are filled by family members of firm heads. Family ownership also remains highly prevalent in developed countries. Multiple members of the same family are major owners or managers in 29% of Fortune 100 companies (Miller et al., 2007). Using a similar definition of family firms, American family businesses have been estimated to account for 12% of GDP and 15% of employment (Shanker & Astrachan, 1996).²

Despite their ubiquitousness, only recently have family firms become a popular topic of study in economics. Recent papers have examined the extent of family ownership and control in publicly traded firms (La Porta, Lope-de-Silanes, &

Shleifer, 1999; Claessens, Djankov, & Lang, 2000; Faccio & Lang, 2002), the effect of family ownership on firm performance (Anderson & Reeb, 2003; Perez-Gonzalez, 2006), and the way in which the legal and institutional environment and capital market development affect the development of family businesses (Burkart, Panunzi, & Shleifer, 2003; Bhattacharya & Ravikumar, 2003; Ilias, 2006; Mueller & Philippon, 2011). Bertrand et al. (2008) examine how family relationships affect the organization and performance of business groups in Thailand. Bennedsen et al. (2007) analyze an extensive data set of Danish private firms to investigate how family structure affects firm succession decisions and firm performance. Bloom and Van Reenen (2007) find that family firms passing management control down by primogeniture are associated with inferior performance. Thus far, few studies have closely examined the internal organization of family firms, and it remains unclear how family relationships affect managerial compensation, incentive contracting, authority allocation, and job assignments and whether managers who belong to the founding family are treated differently from professional managers.³ In these aspects, family firms remain largely a black box.⁴

This paper seeks to fill this gap by investigating the role of family ties in the internal workings of family firms. We define family firms as those with top managerial positions being held by family members (spouses, siblings, or children) of the firm head. To organize our thinking about the relationship between family ties and the internal organization of a firm, we first develop a principal-agent model that explicitly incorporates family trust between the firm head and managers with which he shares family ties.⁵ We find that the firm head optimally pays a family manager a higher salary but gives her weaker incentives than a professional manager who is otherwise identical to the family manager. However, the family manager works harder than the professional manager because her interests are more aligned with those of the firm head. Next, we explicitly consider the firm head's job assignment decisions and find that more important jobs should be assigned to family managers. In other words, compared with professional managers with equal ability, family managers are expected to hold higher positions and have more decision rights and job responsibilities.

The main contribution of this paper is the empirical analysis, which uses data from a unique survey of heads and managers of Chinese private firms that we conducted. We

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¹ These figures are likely to underestimate the importance of private firms given that they are for firms with annual revenue of at least 5 million yuan and exclude limited liability corporations and foreign invested enterprises, including joint ventures.

² Many studies using different definitions for family firms find them to account for a large share of firms in Europe and the United States (La Porta et al., 1999; Anderson & Reeb, 2003; Villalonga & Amit, 2006).

³ Chami (2001) and Bandiera et al. (2009) are two notable exceptions; we discuss them in more detail below.

⁴ We will also analyze the impact of being a relative of the firm head on the design of incentive contracts and delegation.

⁵ In this paper, we refer to a firm head as *he* and a manager as *she*, purely for expositional ease.

sampled over 600 Chinese private firms and almost 1,600 senior managers (at the division manager level or above). The firm survey elicited detailed information on the family presence in the firm, ownership structure, corporate governance, production and marketing activities, accounting information, and personal characteristics of the firm head. The interviews with managers elicited information not only about personal characteristics such as age, education, and work experience but also on their family ties with the firm head, compensation, share-holding, incentives, decision rights, and job responsibilities. A unique feature of the data set is that multiple managers were interviewed within each firm, some of whom had family ties with the firm head and some of whom did not. This enables us to examine the role of family ties in shaping the organizational design of a firm by using firm fixed-effect regressions that control for the influence of unobserved firm (and firm head) characteristics.

The results of our empirical tests provide strong support for the theoretical predictions. There is a marked difference between the compensation of family managers and that of nonfamily managers. Family managers face weaker incentives but are better paid. Bonuses are less responsive to firm performance for family managers than for nonfamily managers, but family managers enjoy larger bonuses and shareholding deals that cannot be explained by firm performance. We also find that after controlling for the personal characteristics of managers, family managers occupy higher positions in the firm, have more decision rights, and are assigned more job responsibilities than nonfamily managers. Overall, our empirical findings lend strong support to our agency model of family trust.

The rich data also allow us to exclude alternative explanations. First, we show that the differential treatment of family and nonfamily managers is not a result of taste-based discrimination. In theory, discrimination should hurt the performance of a firm and should decline with more intense competition. Results of empirical tests do not support either of these hypotheses. Second, our findings could also be consistent with a theory of succession. If firm heads groom family managers to succeed them, they may feel less need to incentivize current compensation and also may give family managers greater job responsibilities in order to prepare them for succession. We examine this alternative theory by estimating our main regressions separately for the samples of firms with and without a plan of family succession. We find that the main results on incentive contracts are as strong for firms without family succession plans as for those with such plans, suggesting that succession is not the main driver of our results. Finally, family managers may have unobserved attributes that differ from nonfamily managers. However, our results are inconsistent with family managers' having different abilities or risk attitudes than nonfamily managers do. Importantly, unobserved attributes (ability or risk attitude) are expected to change both incentives and the authority of managers in the same direction, which is inconsistent with our results that family managers have weaker incentives but greater authority.

We further divide nonfamily managers into professional managers and relative managers, that is, managers who are relatives of the firm head but with weaker family ties than family managers. Interestingly, in contrast to the situation for family managers, there is little difference between relative managers and professional managers in terms of the responsiveness of bonuses to performance or their position, decision rights, and job responsibilities. The results suggest that the beneficial effect of trust may be smaller for relative managers than for family managers, which is consistent with there being costs associated with treating the firm head's family members and relatives preferentially.

Our paper is closely related to two recent papers. Chami (2001) theoretically analyzes the effects of altruism, mutual trust, and family succession on the design of agency contracts. However, our paper differs from his in that we study other internal organizational design issues (job assignment) in addition to incentive contracting, and our main focus is empirical. Bandiera et al. (2009) consider a market for managerial talent where both firms and managers are heterogeneous. They find that family firms use managerial contracts that are less sensitive to performance and that more talented and risk-tolerant managers are matched with firms with steeper incentive contracts. While they compare managers in family and nonfamily firms, we compare the contracts of family and professional managers within the same firm.

The rest of the paper is organized as follows. Section II presents a theoretical model and derives some testable hypotheses. Section III describes the survey and data and the differences between family and nonfamily managers. In section IV, we present the empirical specifications and results. Section V discusses several alternative interpretations, and section VI concludes.

II. Theoretical Analysis and Empirical Hypotheses

The most important element of family relationships in the internal organizational design of a family firm is trust (Burkart et al., 2003; Ilias, 2006). Trust between the firm head and his family managers that is fostered by family ties and long-term relationships is presumed to reduce agency and monitoring costs. In this section, we present a simple model to analyze how family trust affects a firm's optimal managerial contract design and derive several testable hypotheses.⁶

Consider a principal-agent model in which the principal (here the firm head) hires a risk-averse agent (a manager). The firm's revenue V is given by

$$V = a + bx + \epsilon, \quad (1)$$

where a and $b > 0$ are constants, x is the manager's effort, and ϵ is a mean zero random variable with a variance of σ^2 .

⁶Chami (2001) theoretically analyzes how altruism, trust ("mutual altruism"), and family succession affect optimal contract design. In his model, these three factors all improve the standard incentive contract in a qualitatively similar way and hence are empirically indistinguishable. We model family trust in a similar way.

The parameter b can be interpreted as a measure of the manager's ability or the importance of his work to firm revenue. The manager's effort is unobservable to the firm head and is privately costly to the manager; her effort cost is γx^2 , where $\gamma > 0$ is a positive constant. We suppose that the firm head offers the manager the linear incentive contract,

$$W = \alpha + \beta V, \quad (2)$$

where α is the fixed salary independent of performance and β measures the intensity of the manager's incentives. A larger β means that the manager's pay is more sensitive to firm performance.

As in the standard principal-agent model, we suppose that the firm head is risk neutral and the manager is risk averse. Specifically, the firm head's "intrinsic" payoff is the expected net profit of the firm, which can be expressed as

$$\pi = EV - EW = (1 - \beta)(a + bx) - \alpha. \quad (3)$$

The manager's "intrinsic" payoff is given by the following mean-variance utility function:

$$\begin{aligned} u &= EW - \gamma x^2 - \lambda \text{Var}(W) \\ &= \alpha + \beta(a + bx) - \gamma x^2 - \lambda \beta^2 \sigma^2, \end{aligned} \quad (4)$$

where λ is a positive constant that measures the manager's degree of risk aversion.

To analyze how family trust affects incentive contracting, we suppose that when the manager is a member of the firm head's family, the firm head and the manager care about each other's intrinsic payoff.⁷ Specifically, the firm head's payoff is given by

$$\Pi = \pi + \delta u, \quad (5)$$

and the manager's payoff is given by

$$U = u + \delta \pi, \quad (6)$$

where $\delta \in [0, 1)$ is a parameter that measures the degree of family trust between the firm head and the manager. When $\delta = 0$, we are back to the standard principal-agent model, which corresponds to the hiring of professional managers. Thus, to determine the effect of family trust on incentive contracting, we only need to compare the cases in which $\delta = 0$ and $\delta > 0$. Note that for simplicity, we assume that the firm head and the manager assign equal weight to each other's intrinsic payoff. This symmetry can be easily relaxed

⁷This formulation of family trust stresses the interest alignment feature of trust, that is, that family members care about each other's interests. An alternative view of family trust is that because of close interactions and long-term relationships, a firm head knows a family manager better, which leads to better monitoring of the manager by the firm head and a higher likelihood of the family manager's refraining from shirking because of possible sanctions from other family members. In other words, trust implies lower agency and monitoring costs. Intuitively, these two views of family trust will have the same implications for incentive contracting.

with no discernible effect on the qualitative results. We can also consider the cases in which altruism exists in only one direction. It turns out that if the manager cares about the firm head but not vice versa, all of the theoretical predictions derived below still go through. In that sense, what is important is that managers are what Besley and Ghatak (2005) describe as "motivated agents" who care about the firm head or the long-term interests of the firm.⁸

The manager's reservation utility is \bar{U} . The firm head designs an optimal contract to maximize his total payoff Π subject to the usual incentive compatibility and participation constraints for the manager.

The manager chooses the level of effort that maximizes his total payoff U , as given by equation (6). It can be verified that the manager's optimal effort is given by⁹

$$x = \frac{[\delta + (1 - \delta)\beta]b}{2\gamma}. \quad (7)$$

Intuitively, the manager will exert more effort if the marginal product of effort (b) is higher, if the incentive intensity (β) is greater, if family trust (δ) is stronger, or if the cost of effort (γ) is smaller. Equation (7) is an incentive compatibility constraint facing the firm head. For the professional manager (when $\delta = 0$), the optimal effort is simply $\beta b/2\gamma$.

The participation constraint is

$$(1 - \delta)\alpha = \bar{U} + \gamma x^2 + \lambda \beta^2 \sigma^2 - [\delta + (1 - \delta)\beta](a + bx), \quad (8)$$

where x is the optimal effort given in equation (7).

The firm head chooses (α, β) to maximize Π , subject to the constraints of equations (7) and (8). Solving the maximization problem, we can derive the optimal incentive intensity:

$$\beta = \frac{(1 - \delta)^2 b^2}{(1 - \delta)^2 b^2 + 4\lambda \gamma \sigma^2}. \quad (9)$$

When $\delta = 0$, we obtain $\beta = b^2/(b^2 + 4\lambda \gamma \sigma^2)$. Regardless of whether the manager is a professional manager ($\delta = 0$) or a member of the firm head's family ($\delta > 0$), the firm head must make a trade-off between incentives and insurance, as in the standard moral hazard problem. This trade-off leads to the standard comparative static result from the agency literature: the optimal incentive intensity increases in the manager's ability or marginal product of managerial effort (b) but decreases in the manager's degree of risk aversion (λ), the cost of managerial effort (γ), and the degree of uncertainty (σ^2).

When $\delta > 0$, it is easy to see from equation (9) that β is decreasing in δ . There are two reasons for this result. The first is that because the firm head cares about the family manager's

⁸If, on the other hand, the firm head cares about the managers but not vice versa, theoretical predictions about incentives still hold, but those related to decision-making authority become ambiguous.

⁹All of the derivations in this section are contained in the appendix.

welfare, he internalizes some of the cost of the risk to the family manager and thus decreases the incentive intensity to reduce this cost. The second is that because the family manager cares about the firm head's welfare, she exerts greater effort even without explicit incentives. This result implies that all else being equal, the optimal incentive intensity for family managers is smaller than that for professional managers. Empirically, here "all else being equal" means controlling for the personal characteristics of the managers (for example, age, education, gender, and experience) and the jobs that they are assigned (for example, position, decision power, and job responsibilities). In the empirical analysis, we focus on bonuses as a measure of incentive intensity. We can thus test the following hypotheses:

Hypothesis 1: All else being equal, the bonuses of family managers are less sensitive to firm performance than those of professional managers.

Using equation (8), we can solve for the optimal salary α . It can be verified that as long as \bar{U} is sufficiently large relative to the other parameters of the model, α is increasing in δ . Because the managers in our sample are experienced senior managers, their alternative job options (\bar{U}) are likely to be relatively high paying, which leads to the following hypothesis:

Hypothesis 2: All else being equal, the fixed salary of family managers is larger than that of professional managers.

By plugging equation (9) into equation (7), it can be shown that as long as $(1 - \delta)^2 b^2 < 4\lambda\gamma\sigma^2$ or, equivalently, $\beta < 0.5$, then the manager's optimal effort x is increasing in δ . It is hard to believe that an individual manager will receive more than 50% of the entire firm's marginal revenue. In our sample, managerial bonuses are a very small portion of firm revenues, and managers usually hold very few or no company shares. Thus, at least in our context, it is safe to assume that $\beta < 0.5$, which implies that x increases in δ . Therefore, compared with professional managers, family managers work harder despite the fact that they have less powerful explicit incentive contracts. Unfortunately, managerial effort is not observable even to firm heads, let alone to researchers.

We are able to observe the jobs that are assigned to managers, which can enable us to test the model's predictions indirectly. The standard principal-agent model focuses on incentive contracting for the agent but does not model the agent's position, decision rights, or job responsibilities. Here, we extend the agency model to incorporate the firm head's job assignment decision.

Suppose that there are two managerial jobs in the firm, one of which is more important than the other. Furthermore, suppose that there are two managers, a family manager and a professional manager, who apart from their family ties to the firm are otherwise identical. One manager can perform one

job only; thus, the firm head must decide which job should be assigned to the family manager and which to the professional manager. For simplicity, suppose that the firm head is able to observe two performance measures, V_1 and V_2 , defined by¹⁰

$$V_i = a + b_i x_i + \epsilon_i; \quad i = 1, 2,$$

where x_i is the effort by the manager assigned to job i and ϵ_1 and ϵ_2 are i.i.d. random variables. Let $b_1 > b_2$ so that job 1 is more important than job 2. The interpretation is that for the same managerial effort level, job 1 will generate a higher expected value to the firm than job 2.

We label the job assignment mode A (B) if the family manager is assigned job 1 (job 2). The firm head first makes a decision about the assignment of the jobs and then designs incentive contracts for the two managers. The managers then exert effort. Given the job assignment mode, the equilibrium outcome can be found in exactly the same way as in the basic model. We can thus write the firm head's total expected payoff under job assignment mode A as

$$\Pi^A = \Pi(b_1, \delta) + \Pi(b_2, 0), \quad (10)$$

where $\Pi(b_1, \delta)$ ($\Pi(b_2, 0)$) is the firm head's expected payoff when the family manager (professional manager) is assigned job 1 (job 2). These two terms can be directly derived from the basic model by replacing b with the corresponding b_i . Similarly, we can calculate the firm head's total expected payoff under job assignment mode B as

$$\Pi^B = \Pi(b_1, 0) + \Pi(b_2, \delta). \quad (11)$$

It can be shown that $\Pi(b, \delta)$ is supermodular in b and δ (see the appendix for the proof). According to Milgrom and Shannon (1994), this implies that $\Pi^A > \Pi^B$. That is, all else being equal, the firm head will assign the more important job to the family manager. Here "all else being equal" means controlling for the personal characteristics of the managers (age, education, gender, and experience). Because there are three proxies for job importance in our data, namely, position, decision rights, and job responsibilities, we can derive the following testable hypothesis:

Hypothesis 3: All else being equal, family managers hold higher positions and have more decision rights and job responsibilities than professional managers.

III. Data

A. Survey

We collected data that we use in this paper in 2003 in an extensive field survey of Chinese private firms. We randomly sampled 640 private firms in Jiangsu and Zhejiang

¹⁰ If there is only one observable performance measure for the whole firm, for example, $V = a + b_1 x_1 + b_2 x_2 + \epsilon$, then we will obtain qualitatively similar results, but the analysis will become much more involved.

provinces, two of China's most developed coastal provinces, the first just north and the other just south of Shanghai. A team of enumerators led by one of us visited firms in thirteen randomly selected counties (cities) in the two provinces.

We chose Jiangsu and Zhejiang because of both cost considerations and the variation required for the empirical analysis. The private sectors in the two provinces are among the most developed in China, and there are large inter- and intraprovince variations in firm characteristics. For example, Zhejiang has been a center for private firms in China since the early 1980s, but Jiangsu started to privatize its large collective and state sectors only in the mid-1990s. There is also a good deal of heterogeneity across the regions within each province. There is substantial variation in the economic development and local institutional environments of the thirteen counties in the sample. Firms were sampled mainly from five industries: the garment, textile, electronics, chemical, and machinery industries.

We designed the questionnaires after interviewing several dozen firms during pretests in 2002. Each questionnaire contained two components: a firm-level survey and a managerial interview. The firm-level survey consisted of two parts. In the first part, the enumerators conducted a face-to-face interview with the head of each firm (called *yibashou*). For most of the firms in our sample, the firm head is also the largest owner of the firm. The firm head survey elicited detailed information on the characteristics of the firm (ownership structure, corporate governance, and production and marketing activities) and the personal characteristics of the firm head. The second part of the firm-level survey collected detailed accounting information about the firms for the three years between 2000 and 2002.

In the manager survey, we interviewed two or three middle or top managers (not including the firm head) from each firm. Upon arriving at each firm, the enumerator asked the firm head to provide a full list of all senior and middle managers of the firm, and our enumerator randomly chose two or three from the list (depending on the size of the pool) to conduct a 15-minute face-to-face interview. In case the selected manager was absent, we conducted a 15-minute telephone interview.¹¹ Having information about multiple managers in each firm allows us to use firm fixed-effects regressions to filter out the impact of firm-specific and head-specific characteristics. The interviews not only elicited information on the personal characteristics of the managers (age, education, and work experience), but also produced detailed data on their family ties with the firm head and on each manager's compensation, shareholding, incentives, decision rights, and job responsibilities. In total, we have a data set of about 1,600 managers to use in this study.

¹¹ Overall, the refusal rate for our firm survey is very low (less than 2%). In any case, selection at the firm level may be relatively less important given that we focus on within-firm variation in our empirical tests. The number of refusals from managers when the firm head agreed to be interviewed is almost 0.

B. Firms and Firm Heads

To give a general picture of the sample, we first present some descriptive statistics on the firms and firm heads in table 1. The firms are relatively young, with an average age of about twelve years, which reflects the fact that China officially recognized the legal status of private companies only in the late 1980s.¹² The firms are of medium size, on average having assets of 67.7 million RMB (US \$9.91 million), sales of 103 million RMB (US\$15 million), and 282 employees.

Consistent with anecdotal evidence, private firms in our sample have a highly concentrated ownership structure and are generally owned or controlled by the firm heads or their families. On average, the firm head holds 64% of the company shares. The firm heads in our sample are relatively young (average age of 43), well educated (41% have a college degree), and predominantly male (95%).

We construct three measures of firm performance: return on assets (ROA, measured as firm profits divided by total assets), return on sales (ROS, measured as firm profits divided by total sales), and profits per employee (measured as profits divided by total employment). The summary statistics for these three variables can be found in the first panel of table 1.

C. Manager Characteristics

Our main focus in this paper is on the sample of managers, the summary statistics for which are provided in the second panel of table 1. On average, managers are about 39 years old (four years younger than the firm heads), and 77% are male. Interestingly, the managers are substantially less likely to have a college degree than the firm heads (30% versus 41%). On average, they have about seven years of managerial experience in the firm.

In the empirical analysis, our main measure of managerial incentives is the responsiveness of bonuses to firm performance. In Chinese private firms, the compensation for middle- or higher-level managers is usually composed of two parts: the base salary and a bonus payment.¹³ The base salary depends on a manager's seniority and position in the firm but is not directly related to firm performance. The bonus payment is a variable component of the yearly salary, which is linked to the overall performance of the firm, as well as the divisional performance if it can be measured with reasonable accuracy. The base salary is paid to managers monthly, and the bonus payment occurs at the end of the year. Thus, the bonus payment in Chinese private firms is very similar to pay for performance in the incentive contract literature. A typical manager's earnings in our sample totaled RMB 64,000, about 70% of which was base salary and 30% of which was

¹² Before 1987, only private firms with not more than eight employees (called *getihu*, or household firms) were legally allowed.

¹³ See Kato and Long (2006) for more details about managerial compensation in Chinese firms.

TABLE 1.—DESCRIPTIVE STATISTICS

Variables	N	Mean	S.D.	Minimum	Maximum
Firm and firm head information					
Firm age	614	11.88	9.84	1	54
Asset (million RMB)	518	67.7	367.1	0.35	7,334
Sales (million RMB)	505	103	643.5	0.35	8,748
Employment	526	281.6	396.1	16	4,352
Return on assets (ROA)	445	0.10	0.336	-0.25	3.58
Return on sales (ROS)	452	0.05	0.12	-1.48	0.96
Profits per employee (10,000 RMB)	430	1.11	7.51	-139	34.3
Sex of firm head	637	0.95	0.23	0	1
Age of firm head	606	43.44	7.87	23	72
Firm head having college education	627	0.41	0.49	0	1
Percentage of shares held by current firm head	525	0.64	0.29	0.02	1
Number of family members and relatives working in the management	519	1.84	2.27	0	20
Manager information					
<i>General</i>					
Sex	1,536	0.77	0.42	0	1
Age	1,460	39.10	9.23	19	73
College degree dummy	1,550	0.30	0.46	0	1
Years of management experience	1,538	6.90	5.87	0	34
Family manager indicator (1 = yes)	1,528	0.16	0.37	0	1
Relative manager indicator (1 = yes)	1,528	0.11	0.31	0	1
<i>Compensation and shareholding</i>					
Total pay (RMB 10,000)	1,131	6.40	16.68	0.5	283
Salaries (RMB 10,000)	1,395	4.66	15.97	0.2	240
Bonuses (RMB 10,000)	1,136	2.12	4.30	0	90
Percentage of shareholding	1,409	3.58	9.02	0	50
<i>Position level</i>					
Position level (scale 0–3, with 3 the highest)	1,522	1.27	0.86	0	3
<i>Decision rights</i>					
Hiring and firing (scale 0–4, with 4 highest)	1,432	1.76	1.13	0	4
Setting the salary of subordinate (scale 0–4, with 4 highest)	1,429	1.59	1.04	0	4
Firm investment (scale 0–4, with 4 highest)	1,427	1.32	0.95	0	4
Structure change (scale 0–4, with 4 highest)	1,363	0.96	1.09	0	4
Aggregate decision rights	1,351	5.57	3.43	0	16
<i>Job responsibilities</i>					
Personnel department (yes = 1, no = 0)	1,593	0.22	0.41	0	1
Marketing and procurements (yes = 1, no = 0)	1,593	0.31	0.46	0	1
Production and R&D (yes = 1, no = 0)	1,593	0.48	0.50	0	1
CEO office (yes = 1, no = 0)	1,593	0.27	0.45	0	1
Accounting office (yes = 1, no = 0)	1,593	0.25	0.44	0	1
Scope of job responsibilities	1,593	1.53	1.07	0	5

bonus payments.¹⁴ The high ratio of bonus to base salary (over 45%) indicates a high incentive intensity for managers. It is also worth noting that these compensation variables vary considerably. For instance, total annual earnings vary between 5,000 and RMB 2.83 million, with a standard deviation of RMB 0.17 million, almost three times the mean.

In addition to incentive pay, managers sometimes also hold shares in the firm. In our data set, most managers (about 70%) do not hold company shares, and average shareholding is relatively small (3.58%). Many personal and historical factors can influence whether and to what extent managers hold shares, such as who provided the original capital for the firm, local guidelines for firm privatization, and firm succession plans. Whereas annual bonuses provide short-term incentives, shareholding can be thought of as providing long-term incentives for managers.

A distinct feature of our survey is that we obtained information on the positions, decision rights, and job responsibilities of managers, which allows us to examine factors beyond those generally modeled by contract theory. The position rank of the managers in our sample has four levels (0–3) that correspond to division managing director (0), division manager (1), vice president (2), and president (3). In the sample, only 7% of the managers are presidents, and the majority (72%) are positioned at the vice president and division manager levels.¹⁵

In examining decision rights, our survey focuses on four dimensions: hiring and firing employees, determining the salaries of subordinates, making investment decisions, and making decisions on ownership structure changes. The decision rights in each dimension are measured on a scale of 0 to 4, where 0 = no decision rights, 1 = minor decision rights, 2 = moderate decision rights, 3 = major decision rights, and 4 = full decision rights. As shown in table 1, the average

¹⁴In table 1, the sum of the average salary and bonus does not equal the total earnings due to different observations for these variables. The percentages are calculated using the same sample for all three variables.

¹⁵If a nonhead manager is the president, the head is the chairman of the board of directors.

TABLE 2.—COMPARISON BETWEEN FAMILY AND NONFAMILY MANAGERS

Variables	Nonfamily Managers (1)	Family Managers (2)	Difference (3) = (2) - (1)
General			
Sex	0.78 (0.01)	0.72 (0.03)	-0.06** (0.03)
Age	38.89 (0.27)	40.03 (0.57)	1.13* (0.63)
College degree dummy	0.31 (0.01)	0.25 (0.03)	-0.07** (0.03)
Years of managerial experience	6.73 (0.17)	7.71 (0.35)	0.98** (0.39)
Compensation and shareholding			
Total pay (RMB 10,000)	5.48 (0.39)	11.63 (2.46)	6.15** (2.49)
Salaries (RMB 10,000)	3.81 (0.38)	9.41 (1.88)	5.60*** (1.92)
Bonuses (RMB 10,000)	1.83 (0.87)	3.78 (0.68)	1.95*** (0.69)
Percentage of shareholding	2.16 (0.18)	12.03 (1.14)	9.87*** (1.15)
Authority			
Position level (scale 0-3, with 3 the highest)	1.13 (0.02)	1.94 (0.06)	0.81*** (0.06)
Aggregate decision rights	5.05 (0.10)	8.42 (0.22)	3.37*** (0.24)
Scope of job responsibilities	1.44 (0.03)	2.22 (0.09)	0.78*** (0.09)

The numbers in parentheses are standard errors. Significant at *0.1, **0.05, ***0.01.

scores for all of these rights are below 2, which suggests that an average manager is not a major decision maker for important firm issues. To capture the fact that a manager has rights in several dimensions, we define a variable that we call aggregate decision rights that equals the sum of the four individual rights. The mean of this variable is 5.57, which suggests that an average manager does indeed have decision-making power in more than one dimension (the highest score for a single dimension is 4).

Another important aspect of organizational design is assigning job responsibilities to managers. In our survey, job responsibilities are classified into five categories: personnel department, marketing and procurement, production and R&D, accounting, and head office. A dummy variable is defined for each category that equals 1 if a manager is assigned that job and 0 otherwise. The proportion of managers in charge of production and R&D is the highest (48%), whereas only 20% to 30% of managers are tasked with each of the other responsibilities. We also create an aggregate variable, scope of job responsibilities, that equals the sum of the five job responsibility indicators. The mean of this variable is 1.53 for the sample, which suggests that a typical manager is in charge of one and a half departments.

D. Family versus Nonfamily Managers

A key definition for our study is that of family manager. In the survey we directly asked about the relationship between the manager and the firm head. We define family managers as managers who are close family members (including spouses, children, and siblings) of the firm head, relative managers

as those who are part of the extended family but not a close family member of the firm head, and professional managers as those who do not have any family ties with the firm head.¹⁶ Nonfamily managers include the latter two kinds of managers. We focus on comparing family managers with nonfamily managers, but also examine whether relative managers are treated differently from family members. In our sample, 16% of the managers are family managers, 11% are relative managers, and the remaining 73% are professional managers.

We compare the family and nonfamily managers in terms of personal characteristics, compensation, shareholding, position, decision rights, and job assignments and report the results in table 2. The *t*-test for the statistical significance of mean differences allows unequal group variances. Compared with nonfamily managers, family managers are older (40.03 versus 38.89), more likely to be female (0.28 versus 0.22), less likely to have a college education (0.25 versus 0.31), and more experienced in management (7.71 versus 6.73). These differences are all statistically significant.

More interestingly, table 2 reveals marked differences in the contracting and authority variables. The total compensation of the family managers is more than double that of the nonfamily managers (RMB 116,300 versus RMB 54,800), and there is a substantial difference in both basic salaries and bonuses. Family managers also hold more company shares (12% versus 2.2%). In terms of position, the average family manager is a vice president of the firm (with a position level of 1.94), whereas the average nonfamily manager is only a division manager (with a position level of 1.13). Moreover,

¹⁶ Family managers do not include spouses of children due to the concern that marriage decisions could be endogenous.

compared with nonfamily managers, family managers have more decision rights (8.42 versus 5.05) and a larger scope of job responsibilities (2.22 versus 1.44). All of these differences are statistically significant.

These simple statistics reveal remarkable differences between family and nonfamily managers in Chinese private firms. These differences are generally consistent with our theoretical predictions. To provide more systematic tests, we turn to econometric analysis.

IV. Empirical Tests

In this section, we conduct a more rigorous analysis of how family ties affect organizational design by estimating empirical specifications that control for firm fixed effects. In particular, we test whether in comparison with professional managers, family managers have less powerful incentive contracts (hypotheses 1), higher base salaries (hypothesis 2), and higher positions, more decision rights, and greater job responsibilities (hypothesis 3).

A. Incentive Intensity

In this section, we test hypotheses 1, which states that bonuses of family members are less sensitive to firm performance than those of professional managers. Specifically, we estimate the following equation,

$$y_{ij} = \beta_0 + \beta_1 F_{ij} + \beta_2 \pi_j + \beta_3 F_{ij} \pi_j + \delta x_{ij} + \gamma u_j + \epsilon_{ij}, \quad (12)$$

where the dependent variable y_{ij} is the bonus of manager i in firm j ; F_{ij} is a dummy variable that equals 1 if manager i in firm j has family ties with the firm head and 0 otherwise, and π_j is a measure of firm j 's performance.¹⁷ The vector of variables x_{ij} is a set of controls for manager characteristics that includes the manager's gender, age, age squared, education, and management experience. Firm-level characteristics are represented by a vector of variables u_j , which may include variables such as the firm head's ability and industry and regional characteristics.

The key to the empirical test is the coefficient β_3 on the interaction term between family manager indicator variable F_{ij} and the firm performance measure π_j , which captures the difference between family and nonfamily managers in the sensitivity of bonuses to firm performance. Hypothesis 1 suggests that $\beta_3 < 0$.

¹⁷ Profits correspond to revenue in the model, which assumed zero costs of production. Because the firm accounting data include only data on total wages and bonuses, profits are measured net of these costs. Although they include managerial wages and bonuses, this is unlikely to create much bias given that managerial bonuses average just 21,200 yuan, while average firm profits are over 5 million yuan (table 1). The bias that is introduced by the exclusion of managerial bonuses from the profit measure should lead us to overestimate the responsiveness of bonuses to firm performance, but there is no reason to expect that this would be more true for family managers than professional managers.

One concern about estimating equation (12) is that some of the variables in u_j are unobservable, which may cause bias in the estimates of β_3 . Our survey design allows us to deal with this problem by using a fixed-effects model. Although the firm-level data are cross-sectional, we interviewed multiple managers for each firm. We can thus eliminate the impact of all firm-level factors u_j by taking the difference between equation (12) and its firm mean, leading to the following empirical specification:¹⁸

$$y_{ij} - \bar{y}_j = \beta_1(F_{ij} - \bar{F}_j) + \beta_3(F_{ij} - \bar{F}_j)\pi_j + (x_{ij} - \bar{x}_j)\delta + (\epsilon_{ij} - \bar{\epsilon}_j), \quad (13)$$

where \bar{y}_j represents the mean of y_{ij} for managers in firm j . The variables \bar{F}_j , \bar{x}_j , and $\bar{\epsilon}_j$ are similarly defined.

The estimates of equation (13) as reported in table 3 support hypothesis 1. Columns 1 to 3 report the regressions that use the log of bonuses as a dependent variable and ROA, ROS, and profits per employee as performance measures, respectively. The findings are consistent with hypothesis 1 for all three regressions. Although the effect of family ties on bonuses is positive and statistically significant, the interaction effect is negative and significant. These results suggest that although family managers earn more bonuses than nonfamily managers do, their bonuses are less sensitive to firm performance. The difference in sensitivity is also large in size. For example, for a 1% increase in ROA, the response of bonuses to ROA for family managers is 2.2% smaller than for nonfamily managers. In contrast, family managers enjoy 36% more bonuses that cannot be explained by firm performance. Combining these findings, we can conclude that a large portion of the bonuses of family managers is not contingent on firm performance. A plausible reason for this result is that firm heads use noncontingent bonuses to disguise higher fixed payments to family managers to attenuate the concerns of nonfamily managers regarding nepotism.

The main empirical results survive several robustness checks.¹⁹ First, one could argue that bonuses are less incentivized for family managers because family managers already are incentivized through greater shareholding. Although family managers hold greater shares on average than nonfamily managers, most family managers do not own any shares. To test whether this is an important concern, we add shareholding and its interaction with firm performance to the base specification. The coefficient on the interaction of shareholding and firm performance is never statistically significant. Controlling for shareholding reduces slightly the magnitude of the estimated coefficient for the responsiveness of bonuses to firm performance (by 10% to 20%) but does not change the results in any qualitative manner.

¹⁸ While we can control for many important managerial characteristics, there still may be unobserved heterogeneity of individual managers for which we cannot adequately control. To fully address this source of potential bias would require longitudinal data, which are unavailable for this study.

¹⁹ Results are not all reported due to space limitations but are available from the authors on request.

TABLE 3.—THE EFFECT OF FAMILY TIES ON THE SENSITIVITY OF COMPENSATION TO FIRM PERFORMANCE

	Dependent Variable					
	Bonuses (log) (1)	Bonuses (log) (2)	Bonuses (log) (3)	Salaries (log) (4)	Salaries (log) (5)	Salaries (log) (6)
Family manager (FM)	0.36*** (2.81)	0.389*** (3.27)	0.236** (2.40)	0.189* (1.69)	0.317** (2.59)	0.181** (2.04)
FM × ROA	−2.241* (−1.88)			0.102 (0.12)		
FM × ROS		−3.294** (−2.13)			−0.802 (−0.55)	
FM × Profits per Employee			−0.015** (−2.10)			0.011 (1.33)
Sex	0.2*** (3.61)	0.206*** (3.83)	0.2*** (3.69)	0.176*** (3.05)	0.2*** (3.43)	0.192*** (3.29)
Age	0.046** (2.26)	0.047** (2.27)	0.041** (2.04)	0.036* (1.65)	0.033 (1.58)	0.036* (1.68)
Age ²	−0.001** (−2.40)	−0.001** (2.37)	−0.001** (−2.14)	−0.0003 (−1.44)	−0.0004 (−1.37)	−0.0004 (−1.49)
College degree	−0.058 (−0.91)	−0.06 (−0.94)	−0.061 (−0.94)	−0.008 (−0.16)	0.050 (0.78)	−0.047 (−0.09)
Years of managerial experience	0.006 (0.77)	0.005 (0.70)	0.004 (0.49)	−0.005 (−0.79)	−0.006 (−0.94)	−0.005 (−0.87)
Position level	0.123*** (3.65)	0.117*** (3.36)	0.13*** (3.69)	0.195*** (5.33)	0.17*** (4.57)	0.193*** (5.07)
Constant	−0.349 (−0.85)	−0.369 (−0.89)	−0.25 (−0.62)	−0.295 (−0.72)	−0.26 (−0.63)	−0.311 (−0.76)
Observations	785	800	786	940	961	932
R ²	0.14	0.15	0.14	0.16	0.14	0.16

Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

Second, a related concern in the bonus-to-performance sensitivity regressions is that the two parts of the interaction term, firm performance and being a family manager, could be proxying for other firm or manager characteristics. To address this issue, we rerun the regressions in columns 1 to 3 by adding more interaction terms as controls. First, we add an interaction term between the family manager variable and firm size. Second, we add interaction terms between the firm performance measures and other manager characteristics (sex, age, age squared, college degree, managerial experience, and position). Third, we add both sets of interaction terms. Finally, we add interaction terms between firm size and other manager characteristics to equation (13). In all cases, the coefficients on the interaction terms between firm performance and being a family manager are similar in magnitude and in most cases they remain statistically significant.

Third, one might be concerned that differences between family and nonfamily managers in the sensitivity of bonuses to firm performance could be due to differences in the job characteristics of family and nonfamily managers. To check whether this is the case, we estimate versions of equation (13) in which we include as an additional control each of our three main job characteristic variables (position level, aggregate decision rights, and scope of job responsibilities) and its interaction with firm performance. The interactions of the job characteristic and firm performance variables are

rarely statistically significant, and including the additional controls has no systematic effect on the magnitudes of the coefficients of interest.²⁰

We also rerun the regressions in table 3 including dummy variables for the type of division in which the manager works, plus interactions of these dummies with firm performance, to take account of the impact of divisional differences on pay-for-performance sensitivity. The key results reported in table 3 are very robust to this new specification: the magnitude and significance of the coefficients on the interaction term between family manager and performance (in terms of ROA, ROS, and profits per employee) are very similar to the original results in table 3.

Finally, as a falsification test, we also run the same set of regressions using the log of base salary as the dependent variable. As the base salary generally should not be contingent on performance, something may be wrong with our empirical specification if the interaction term is found to be significantly negative. The regression results suggest no evidence of a false specification, as the coefficients on the interaction terms in columns 4 to 6 are not significantly different from 0.

²⁰ Controlling for position has no discernible effect, controlling for control rights slightly reduces the sensitivity of bonuses to firm performance, and controlling for job scope slightly increases the sensitivity of bonuses to firm performance.

TABLE 4.—FAMILY TIES AND COMPENSATION AND INCENTIVE CONTRACTING OF FIRM MANAGERS

Independent Variables	Dependent Variables			
	Log of Salaries (1)	Log of Salaries (2)	Log of Bonuses (3)	Log of Bonuses (4)
Family manager	0.340*** (4.17)	0.327*** (4.04)	0.222*** (2.88)	0.186** (2.48)
Sex	0.218*** (4.43)	0.176*** (3.62)	0.165*** (3.64)	0.151*** (3.29)
Age	0.045** (2.49)	0.042** (2.30)	0.039** (2.19)	0.036** (2.06)
Age ²	-0.0005** (-2.21)	-0.0005** (-1.97)	-0.0005** (-2.19)	-0.0004** (-2.00)
College degree	0.062 (1.09)	0.078 (1.36)	-0.049 (-0.88)	-0.035 (-0.63)
Years of managerial experience	-0.006 (-1.15)	-0.006 (-1.26)	0.002 (0.27)	0.0003 (0.04)
Position level	0.174*** (5.69)	0.118*** (3.66)	0.107*** (3.62)	0.059* (1.80)
Production and R&D		0.169*** (3.08)		0.103** (1.96)
Accounting office		0.049 (0.82)		0.095* (1.83)
Marketing and procurements		0.178*** (3.94)		0.238*** (5.10)
Personnel department		0.014 (0.25)		0.047 (0.90)
Head office		0.009 (0.19)		-0.045 (-1.04)
Constant	-0.490 (-1.35)	-0.523 (-1.49)	-0.206 (-0.58)	-0.240 (-0.68)
Observations	1,266	1,266	1,036	1,036
R ²	0.17	0.19	0.11	0.15

Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

B. Base Salary

Next, we test hypothesis 2, that the base salary of family managers is larger than that of nonfamily managers. Again, we estimate a fixed-effects model that is specified as

$$y_{ij} - \bar{y}_j = \beta_1(F_{ij} - \bar{F}_j) + (x_{ij} - \bar{x}_j)\beta_2 + (\epsilon_{ij} - \bar{\epsilon}_j), \quad (14)$$

where y_{ij} represents the base salary of manager i in firm j and \bar{y}_j is the average of this variable for each firm. This specification is identical to equation (13) but without the interaction term.

The regression results, which are reported in column 1 of table 4, show that the base salary of family managers is larger than that of nonfamily managers, which provides support for hypothesis 2. Note first that the family manager dummy is significant at the 1% level and that the magnitude of the coefficient is large: the base salary of family managers is 34% higher than that of nonfamily managers. Not surprisingly, a

manager's position is an important determinant of salary. An increase in one position level is associated with an increase in base salary of approximately 17%. Male managers are paid substantially more. The age effect takes an inverted U shape. A simple calculation based on the estimated coefficients on age and age squared in column 1 shows that the base salary increases with age until a manager reaches 45 years of age and then declines. A somewhat surprising result is that both college education and managerial experience have no significant effect on the base salary level.

One concern in interpreting the higher base salary of family managers is that family and nonfamily managers may be in charge of different divisions that have different compensation packages. In other words, the family manager dummy may simply be picking up divisional differences in compensation and shareholding. To address this issue, we add a set of division dummy variables as controls in the regression. The results continue to support hypothesis 3: the coefficients

TABLE 5.—FAMILY TIES AND DECISION RIGHTS, JOB RESPONSIBILITIES, AND POSITIONS OF MANAGERS

Independent Variables	Dependent Variables					
	Aggregate Decision Rights (1)	Scope of Job Responsibility (2)	Position Level (3)	Aggregate Decision Rights (4)	Scope of Job Responsibility (5)	Position Level (6)
Family manager	3.30*** (10.63)	0.69*** (5.96)	0.835*** (11.23)	2.08*** (6.64)	0.331*** (2.69)	0.483*** (5.74)
Sex	1.044*** (4.16)	0.159* (1.94)	0.392*** (5.67)	0.76*** (3.15)	−0.041 (−0.49)	0.213*** (3.08)
Age	0.327*** (3.93)	0.061** (2.20)	0.082*** (3.98)	0.21*** (2.75)	0.024 (0.87)	0.047** (2.34)
Age ²	−0.004*** (−3.72)	−0.001* (−1.99)	−0.001*** (−3.68)	−0.002** (−2.65)	−0.0003 (−0.75)	−0.0005** (−2.15)
College	0.24 (1.09)	0.086 (1.05)	0.022 (0.34)	0.209 (0.98)	0.059 (0.69)	−0.015 (−0.23)
Years of managerial experience	0.057** (2.47)	0.007 (0.92)	0.016*** (2.61)	0.045* (1.92)	−0.005 (−0.71)	0.009 (1.49)
Position level				0.96*** (6.21)	0.264*** (5.00)	
Aggregate decision rights					0.075*** (5.17)	0.074*** (6.45)
Scope of job responsibility				0.54*** (5.15)		0.146*** (4.86)
Constant	−2.995* (−1.83)	−0.044 (−0.08)	−1.021** (−2.49)	−2.096 (−1.39)	0.290 (0.54)	−0.661* (−1.68)
Observations	1,259	1,413	1,381	1,235	1,235	1,235
R ²	0.23	0.08	0.23	0.34	0.20	0.32

Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

on the family manager dummy are all statistically and economically significant (column 2). The newly added division dummies show that the base salary in the divisions of production and R&D and of marketing and procurement is significantly higher than in the other divisions.

For completeness, we also estimate equation (14) using the log of bonuses as the dependent variable, even though our theory does not make any direct predictions regarding bonuses. Interestingly, as shown by columns 3 and 4 of table 4, family managers have higher bonuses, and the magnitudes are also large: family managers receive 18.6% to 22.2% more bonuses than nonfamily managers.

C. Decision Rights, Job Responsibilities, and Position

We next test hypothesis 3 by investigating whether family ties affect the responsibilities and positions of managers. In table 5, we report the results of the fixed-effects regressions with three dependent variables: aggregate decision rights, scope of job responsibilities, and position level.²¹ For each of the three dependent variables, we estimate one specification

²¹ Although some of our dependent variables are categorical, we use the linear probability model in order to include the fixed effects. Applying the

with controls for manager characteristics only (columns 1–3) and another in which we also control for the other two job characteristics (columns 4–6).

Consistent with the theoretical predictions of hypothesis 3, family managers have 3.3 more decision rights than nonfamily managers (compared to the sample mean of 5.57), are in charge of 0.69 more divisions or departments (compared to the sample mean of 1.53), and hold positions of 0.84 higher rank (compared to the sample mean of 1.27). Each of the job dimensions has salience; after controlling for the other job characteristics, the differences in the decision rights, scope of job responsibilities, and position level of family versus nonfamily managers become smaller (2.08, 0.33, and 0.48, respectively) but remain highly statistically significant. Looking at the other independent variables, one interesting finding is that female managers are given fewer decision rights and hold lower positions than their male counterparts, although

linear probability model to categorical response variables can cause unreasonable predicted values and heteroskedastic error terms. However, as we are interested only in the predictions surrounding the sample means, unreasonable predictions are highly unlikely, as argued by Woodridge (2002) and Moffit (1999). To deal with the heteroskedasticity issue, we use the Eicker-White robust standard errors.

TABLE 6.—THE EFFECT OF FAMILY TIES ON THE ASSIGNMENT OF INDIVIDUAL DECISION RIGHTS AND JOB RESPONSIBILITIES: PROBIT ESTIMATION

Dependent Variables: Decision Rights in	Marginal Effect of Family Manager	Dependent Variables: Job Responsibilities	Marginal Effect of Family Manager
Hiring and firing	0.861*** (3.64)	Personnel department	0.445*** (4.26)
Setting the salary of subordinates	1.640*** (4.54)	Marketing and procurement	0.564*** (5.45)
Firm investments	1.172*** (4.69)	Production and R&D	-0.045 (-0.43)
Structural change	1.023*** (5.88)	CEO office	0.288*** (2.66)
		Accounting office	0.288*** (2.63)

All the regressions control for the manager's sex, age, age squared, college, years of management experience and position level. Numbers in parentheses are *t*-statistics. Significant at *0.1, **0.05, ***0.01.

their job responsibilities are not different from those of male managers.

Family managers may have more decision rights or job responsibilities than nonfamily managers in certain dimensions but not in all dimensions, but our use of aggregate variables for decision rights and scope of job responsibilities does not allow us to examine such subtleties. To explore this, we run the same regressions as in columns 1 and 2 in table 5 except that the dependent variables of “aggregate” decision rights and job responsibilities are replaced by the individual decision rights and job responsibilities, and we report marginal probabilities from the estimation of probit models. To save space, for each dependent variable, we report the coefficient only on the family manager dummy in each regression.

Table 6 shows that family members have more authority in all four decision areas. The estimated marginal effects of the family ties on the allocation of the decision rights are positive and significant in all cases. Comparing the magnitudes of the coefficients, we find that family managers have relatively more authority in making decisions on salary setting and investment decisions. As a robustness check, we put the five job responsibility dummies in the decision rights regressions to control for the effect of functional areas on authority assignment and find that our main results still hold.

Table 6 also presents some interesting results on the effect of family ties on the assignment of job responsibilities. Chinese private firms are more likely to use professional managers for positions such as production and R&D, which require technical skills and are easier to monitor. In contrast, they tend to use family managers in key business departments such as marketing and procurement, which are directly related to the firm's cash flow and are harder to monitor. They also let family members head the personnel division (in charge of hiring, firing, and promotion) and the CEO office (assisting the CEO in dealing with all important matters), which are very powerful divisions. Family ties have a positive effect on the likelihood of being assigned to the accounting office. Accounting offices deal with the cash flow, tax filing, and financial reporting of the firm, which the firm needs its trusted people to be in charge of.

To summarize, we find marked differences between family and nonfamily managers that are consistent with the

theoretical predictions summarized in hypotheses 1 to 3. Compared to nonfamily managers, the bonuses of family managers are less sensitive to firm performance and their base salary is higher. Family managers also hold higher positions and have more decision rights and more job responsibilities. Moreover, family managers are more likely to head divisions such as sales and procurement, personnel, and the CEO office and less likely to be in charge of knowledge-intensive divisions such as production and R&D.

D. Selection and the Costs of Preferential Treatment

It is relatively straightforward to show using our theoretical model that the strength of family ties with a manager has an ambiguous impact on firm performance. Family ties help performance by eliciting greater effort from managers but can hurt firm performance because the firm head cares not just about firm profits but also the utility of managers.²²

One limitation of the theoretical model is that it completely overlooks additional potential costs of hiring family members that are likely to be present in real-world contexts. First, although family members are more trustworthy from the viewpoint of the firm head, they are likely to be less qualified for managerial jobs than nonfamily managers given the limited talent pool within the family. Table 2 provides some evidence for this generalization, showing that family managers are significantly less educated than nonfamily managers. Giving family members more authority thus may directly hurt the profitability of the firm. Moreover, favoring family members out of concern for their utility could create resentment among nonfamily managers, reducing their morale.

Although we do not model these costs theoretically because of their complexity, they may play an important role

²² Recall that a firm's profit is given by $\pi = EV - EW = (1 - \beta)(a + bx) - \alpha$. We have shown that β is decreasing in δ and x is increasing in δ ; thus, the first term is increasing in δ . However, α is also increasing in δ . More specifically, α contains the term $\bar{U}/(1 - \delta)$ that obviously increases in δ . Thus, if \bar{U} is very large, then π will be decreasing in δ , but if \bar{U} is not too large, then π will be increasing in δ . When job assignment is taken into account, the firm's total profit under the optimal mode is $\pi^A = \pi(b_1, \delta) + \pi(b_2, 0)$. Clearly, δ appears only in the first term, which is the profit generated by the family manager, and thus the effect of δ on π or π^A is ambiguous.

TABLE 7.—DIFFERENCES BETWEEN FAMILY AND RELATIVE MANAGERS

Dependent Variables of Different Regression Models	Coefficients on Variables			
	Family Manager (1)	Family Manager × ROA	Relative Manager (2)	Relative Manager × ROA
Log of bonuses	0.347*** (2.66)	-2.148* (-1.77)	-0.045 (-0.48)	-0.352 (-0.50)
Log of bonuses	0.220*** (2.80)		-0.015 (-0.22)	
Log of salaries	0.340*** (4.04)		0.001 (0.02)	
Shareholding	5.745*** (4.26)		-3.307*** (-3.46)	
Position level	0.844*** (11.24)		0.088 (0.99)	
Aggregated decision rights	2.352*** (7.36)		-0.046 (-0.15)	
Scope of job responsibilities	0.382*** (3.40)		-0.072 (-0.66)	

All the regressions except for the regression with position level as dependent variable include constant terms and control for the manager's sex, age, age squared, college, years of management experience, and position level. Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

empirically. If the costs of favoring family members are taken into account, then the fact that family members are indeed hired as managers and given greater authority and higher positions suggests that the beneficial effects of family trust dominate the potential costs.

However, the effect of family trust may not dominate in all situations, especially when trust between the manager and the firm head is weaker, such as with relative managers. The firm head is likely to have some trust in relatives— $\delta > 0$ in equations (5) and (6)—but not to the same degree as with family members. From this perspective, all else being equal, one would expect the treatment that relative managers receive to be somewhere between that received by family members and that received by professional managers. On the cost side, our data show that relative managers are less qualified than family managers, with less education and managerial experience (see table A1). Thus, favoring relative managers may be even more costly than favoring family managers. Due to the smaller benefit and larger cost, relative managers are likely to enjoy less favorable treatment than family managers.

To examine whether the response of incentives to performance for relative managers is different from that for professional managers, we run the same set of regressions but with a new variable, a relative manager dummy, which indicates whether the manager is a relative of the firm head. The coefficients on the family manager dummy, the relative manager dummy, and their interaction terms with firm performance are reported in table 7, with each row representing a regression with a different dependent variable.

Interestingly, in contrast to the results for family managers, incentives for relative managers do not differ much from professional managers. The coefficients on the relative manager dummy and its interaction term nearly always lack statistical significance.²³ The only exception is that relative

²³ We have also checked whether relative managers are any different from professional managers in the assignment of individual decision rights and job responsibilities. We find no significant differences in any of these dimensions.

managers have significantly less shareholding than professional managers. According to our previous argument, these results suggest either that there is little trust between firm heads and relatives or large costs of treating relatives differently, or both. The lack of difference between relative and professional managers also justifies our focus on managers with a close family relationship with firm heads in the main empirical analysis.

V. Alternative Explanations

We find that family status plays a significant role in the organizational design of firms. Thus far, we have interpreted this role of family ties as a result of mutual trust between firm heads and their family members. However, there may be other interpretations for the different treatment of family and professional managers. In what follows, we discuss alternative hypotheses.

A. Taste-Based Favoritism and Discrimination

Family heads may prefer to surround themselves with family members and display taste-based discrimination against nonfamily members (Becker, 1971). They pay family members more and give them more powerful positions with greater authority simply out of favoritism. Such discrimination is likely to lead to inefficiencies that will persist as long as competitive pressures are not too strong. With intense competition, however, firms that discriminate are less likely to survive.²⁴ This alternative interpretation has two empirical implications. First, in more competitive industries, we would expect less discrimination and a smaller effect of family status on the allocation of compensation and authority. Second, taste-based discrimination against nonfamily members implies that the efficiency of the firm will be compromised. If

²⁴ For example, Bloom and Van Reenen (2007) find that higher competition is associated with a lower probability of primogeniture successions (passing management control down to the eldest son).

TABLE 8.—COMPETITION AND THE ROLE OF FAMILY TIES IN THE ORGANIZATIONAL DESIGN

Dependent Variables of Different Regression Models	Coefficients on Variables			
	Family Manager	Family Manager × Concentration	Family Manager × ROA	Family Manager × ROA × Concentration
Log of bonuses	0.327 (1.40)	-0.0002 (-0.03)	-2.667 (-1.35)	0.039 (0.86)
Log of salaries	0.400*** (3.53)	-0.004 (-1.44)		
Log of bonuses	0.156 (1.52)	0.003 (0.68)		
Shareholding	6.432*** (3.31)	0.000 (0.00)		
Position level	0.779*** (7.94)	0.004 (1.21)		
Aggregated decision rights	2.408*** (6.18)	-0.002 (-0.18)		
Scope of job responsibilities	0.361** (2.36)	0.003 (0.62)		

All the regressions except for the regression with position level as dependent variable include constant terms and control for the manager's sex, age, age squared, college, years of management experience, and position level. Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

TABLE 9.—EFFECT OF FAMILY PRESENCE IN THE MANAGEMENT ON FIRM PERFORMANCE: OLS REGRESSIONS

	Dependent Variables				
	Employment Growth (1)	Log of Sales (2)	Return on Assets (3)	Return on Sales (4)	Profits per Employee (5)
Proportion of family members in management	0.007 (0.10)	0.206 (0.79)	0.218 (0.74)	0.077 (0.79)	4.311 (1.61)
Assets (log)		0.576*** (9.48)	-0.04*** (2.10)	-0.006 (-0.77)	0.612*** (2.86)
Employment (log)	0.039** (2.18)	0.370*** (4.79)			
Firm age	-0.008*** (-4.27)	-0.002 (-0.42)	-0.001 (-0.68)	-0.000 (-0.55)	-0.028* (-1.96)
Constant	0.070 (0.71)	1.651*** (4.46)	0.324** (2.24)	0.070 (1.20)	-4.255** (-2.14)
Observations	318	322	293	293	290
<i>R</i> ²	0.16	0.68	0.12	0.09	0.18

All regressions have controlled for industry and region dummies. Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

this is the case, we should expect firms with family managers to be less profitable than nonfamily firms.

We conduct empirical tests to assess these two empirical implications. First, we examine the impact of industry-level competition on the extent of favoritism in family firms. We first calculate the Herfindahl index for each industry (at the four-digit level) in 2001 and add an interaction term of this concentration measure with the family manager indicator to the main specifications in tables 3 to 5.²⁵ If there is taste-based discrimination, we expect the coefficient on this interaction term to be positive, meaning that in more concentrated (less competitive) industries, family ties will have a greater impact on compensation and job responsibility and authority. Table 8 shows that the coefficient on the interaction term is small and statistically insignificant in all regressions and even negative in some regressions. Meanwhile, the effect of the family manager indicator remains significant in most cases.

²⁵ The Herfindahl index for each industry is calculated using data from the Industrial Enterprise Survey conducted annually by China's National Bureau of Statistics. This survey includes all industrial establishments in China with annual sales exceeding RMB 5 million.

Second, we test whether family firms perform differently from nonfamily firms. We turn to the firm-level data and examine five measures of firm performance: employment growth, log sales, return on assets, return on sales, and profits per employee. The family nature of a firm is captured by the proportion of family members and relatives in the management team. In the survey, we asked the firm head the following question: "How many family members and relatives are in management?" This survey question does not differentiate family members from relatives. All of the regressions include industry and region dummies to control for industry- or region-specific factors.

The OLS regression results, which are reported in table 9, show that the presence of family and relative managers has no effect on firm performance. Notice that the sign of the estimated coefficients on the proportion of managers who are family members or relatives is positive in all five regressions, although statistically insignificant. Among the control variables, the firm size variables (log assets and log employment) have a significantly positive impact on performance and firm age has a negative impact on firm performance. Although the OLS regressions do not address the endogeneity of family

presence in the firm, they provide some evidence that firms with strong family involvement are not “inferior” to those with less family presence.²⁶ This is consistent with some empirical findings that family ownership has a mixed effect on firm performance (Perez-Gonzalez, 2006; Villalonga & Amit, 2006).²⁷ Overall, there is no convincing evidence of a negative effect of family presence on firm performance, which suggests that taste-based favoritism or discrimination is unlikely to explain our results.

B. Family Succession

The significant role of family managers in private firms could be driven by succession concerns rather than mutual trust. If family members are expected to take control of the firm in the future, firm heads may give them more responsibilities in the firm to help prepare them for the top job and also expect them to exert greater effort. This could justify a higher salary and reduce the need to incentivize compensation.

Our survey contains information on the history of succession and potential succession in the future. Nearly 20% of firms experienced at least one succession prior to our survey, among which 22% of the time control was transferred to a family member. This means that only 4% of the firms in our sample have experienced family succession in the past. In the survey, we also asked the firm head, “Are you going to transfer ownership of the firm to your family members?” There are three possible responses: very likely, likely, and unlikely. About 39% of firm heads in the sample answered “very likely” or “likely.” We define family succession firms to be those that have experienced family successions in the past or are likely to do so in the future.²⁸ We then run regressions separately for the two subsamples, family succession firms and nonfamily succession firms, and compare the coefficients on the family firm manager variable. To save space, we

²⁶ We tried using the size of the family of the firm head normalized by the size of the management team as an instrument for the firm presence variable. We found that the coefficient on family presence remains positive for our three key performance measures: ROA, ROS, and profits per employee. For profits per employee, it is statistically significant at the 10% significance level. However, we caution that family size could be related to unobserved motivations or characteristics of the firm head, so these results should be interpreted cautiously.

²⁷ Using cross-country data, Bloom and Van Reenen (2007) present evidence that family firms are not necessarily correlated with inferior management practices, but family firms with primogeniture successions are.

²⁸ Given that traditional Chinese culture attaches great importance to families, people may wonder how credible a plan for a nonfamily succession will be. We cannot exclude the possibility that some firm heads who had originally planned on nonfamily successions actually passed firm control to their families. But it is not surprising to see such nonfamily successions in China for at least two reasons. First, due to the implementations of the one-child policy in the late 1970s, it is quite likely that a firm head ends up with a daughter instead of a son to be considered for possible succession. In Chinese culture, daughters are generally not good candidates for firm succession. Second, even with male heirs for a family succession, those heirs may be neither interested nor competent in running firms. In this case, selling the ownership shares to others may be an appealing option for the firm head.

TABLE 10.—FAMILY TIES AND COMPENSATION, SHAREHOLDING AND AUTHORITY OF FIRM MANAGERS, USING TWO SUBSAMPLES

Dependent Variables	Subsample	Coefficient on Family Manager	R ²	N
Log of salaries	I	0.446*** (3.50)	0.15	510
	II	0.240** (2.53)	0.21	756
Log of bonuses	I	0.268** (2.21)	0.07	415
	II	0.215** (2.32)	0.17	621
Proportion of shareholding	I	7.676*** (3.95)	0.24	512
	II	4.214** (2.23)	0.17	757
Position level	I	0.864*** (8.32)	0.25	554
	II	0.750*** (7.05)	0.23	827
Aggregated decision rights	I	2.179*** (5.49)	0.40	497
	II	2.434*** (5.01)	0.27	738
Scope of job responsibilities	I	0.426** (2.70)	0.18	554
	II	0.361** (2.28)	0.14	827

Sample I represents the subsample of all family-succession firms, and sample II represents the subsample of all nonfamily succession firms. All the regressions except for the regressions with position level as dependent variable include constant terms and control for the manager's sex, age, age squared, college, years of management experience, and position level. Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

report the estimated coefficients only on the family manager variable.

Regression results suggest that family succession cannot explain our main empirical results. As shown by table 10, even when the firm head does not plan a family succession, family managers have higher salaries, bonuses, and shareholding and have higher-rank positions with more responsibilities and more decision rights. The coefficients are even greater in magnitude (except for decision rights) when the firm head plans a family succession, though the differences are not statistically significant in most cases.

Table 11 reports results on the effect of family status on incentive intensity for the two subsamples. For both subsamples, the coefficients on the interaction terms between family manager and firm performance are negative, meaning that family managers have bonuses that are less sensitive to firm performance. However, interestingly, only for nonfamily succession firms are coefficients on the interaction terms statistically significantly different from 0.

C. Unobserved Heterogeneity

Besides differing in trustworthiness, family and nonfamily managers may also differ in other dimensions, such as ability or risk aversion, that are known to firm heads but unobserved by the econometrician, which could affect pay sensitivity to performance and job allocation decisions. These two traits could be correlated, given evidence by psychologists that (cognitive) ability is positively related to risk

TABLE 11.—FAMILY TIES AND THE SENSITIVITY OF COMPENSATION TO FIRM PERFORMANCE, USING TWO SUBSAMPLES

	Dependent Variable: Bonuses (Log)					
	Sample I	Sample II	Sample I	Sample II	Sample I	Sample II
Family manager (FM)	0.269 (1.52)	0.495*** (2.70)	0.484** (2.11)	0.355*** (2.80)	0.231 (1.52)	0.293** (2.43)
FM × ROA	-0.984 (-0.65)	-3.524** (-1.97)				
FM × ROS			-4.490 (-1.37)	-2.294*** (-2.93)		
FM × Profits per Employee					-0.016 (-1.20)	-0.017** (-2.10)
Observations	306	479	311	489	303	483
R ²	0.10	0.21	0.13	0.20	0.10	0.19

Sample I represents the subsample of all family succession firms, and sample II represents the subsample of all nonfamily succession firms. All the regressions except for the regressions with position level as dependent variable include constant terms and control for the manager's sex, age, age squared, college, years of management experience and position level. Numbers in parentheses are *t*-statistics based on robust standard errors. Significant at *0.1, **0.05, ***0.01.

tolerance (Frederick, 2005). Bandiera et al. (2009) found that less talented and more risk-averse managers tend to be matched with family firms; however, unlike them, we do not find evidence of worse performance by family firms.

Although not derived explicitly, the theoretical model suggests that higher effort by family managers and concern for the welfare of family members may lead firm heads to prefer hiring family managers, implying that only high-ability nonfamily managers would be hired. However, the unobserved traits of family and nonfamily managers also depend on the supply of both types of managers, making the nature of selection bias hard to predict. For this reason, we consider all four possible cases: family managers have higher ability, lower ability, higher risk aversion, and lower risk aversion. It turns out that none of these cases is consistent with the empirical evidence. A key intuition for understanding this result is that any unobserved attribute is expected to cause incentives and authority to move in the same direction, either increasing both or decreasing both. This is consistent with the complementarity of incentives and authority found by many principal-agent models. Only trust yields a theoretical prediction of lower incentives and greater authority.

First, the unobserved ability of managers cannot explain our empirical results. If family managers have higher unobserved ability than nonfamily managers, then they should have a greater value of b , which by equation (9) implies greater incentive intensity. However, the empirical results show the opposite: that the incentives of family managers are less intense. If family managers have lower unobserved ability, then firm performance should be lower in family firms and family managers should be given less job responsibility, neither of which is consistent with the empirical results.

Second, our results cannot be explained by unobserved risk preference. If family managers are less risk averse than nonfamily managers,²⁹ then any agency theory would predict that

their pay should be more incentivized and responsive to firm performance. This prediction is not supported by our empirical results. If family managers are more risk averse,³⁰ then they would have flatter compensation profiles, as we observe in the data. However, a more risk-averse family manager should also be given less responsibility and fewer decision rights, which are not supported by our data.³¹ This suggests that unobserved differences in risk aversion are unlikely to explain the differences we observe between family and nonfamily managers.

Finally, we consider whether information quality can explain the difference in incentive contracts between family and professional managers. It is likely that firm heads are more certain about the ability and risk attitude of family members than those of nonfamily managers. To simplify analysis, we assume that the two types of managers have the same expected ability and risk aversion but with greater variance in these traits.³² Introducing mean-preserving and symmetric uncertainty over the parameters of our basic model, the manager's ability (b), risk aversion (λ), and cost of effort (γ), we can derive the family head's expected payoff function and then figure out the optimal incentive intensity β . It can be shown that the optimal incentive intensity will increase with such uncertainty about b and γ and will be unaffected by such uncertainty about λ . This is consistent with family managers having bonuses that are less responsive to firm performance than nonfamily managers. However,

In the 1980s and early 1990s, when most firms in the sample started up, there was strong ideological and institutional discrimination against private ownership (Li et al., 2008). Being an entrepreneur at that time required courage and high risk tolerance.

²⁹ This could happen through sorting (Bandiera et al., 2009). Family members who work for the family business may be less venturesome and seek security in the family firm rather than compete in the open market, taking advantage of the altruism of firm heads.

³⁰ Incentive intensity β will be lower when the manager has higher risk aversion λ . The lower λ leads to lower effort level. Due to the complementarity between effort and job assignment, the manager should be assigned less important jobs.

³² Note that better information on family managers could enable firm heads to hire family members with more attractive traits in expectation (higher ability, lower risk aversion) than nonfamily managers, leading to the unobserved heterogeneity problems described above, which were shown to be unable to explain our main findings. Thus, this assumption is well grounded.

²⁹ Risk preferences could be inherited, which means family managers may have risk preferences similar to those of the firm owner. There is some evidence based on studies of twins that risk attitudes have a biological inheritable component, in which case preferences for risk of children would be positively correlated with preferences for risk of parents (Dohmen et al., 2006). Since firms in the sample are relatively young (the average age is less than 12 years), the current firm head generally is also the founder.

greater incentive intensity also implies greater job responsibilities because of greater managerial effort induced by higher-powered incentives. This prediction is inconsistent with the empirical results, suggesting that information quality is not the driver of our results.

VI. Conclusion

Using a unique data set of Chinese private firms that contains detailed information about multiple senior managers in each firm, we investigate how family ties with the firm head affect the internal organization of firms. We find strong evidence that family ties affect managerial compensation, incentive contracting, shareholding, position level, decision rights, and job responsibilities. In particular, we find that despite the fact that family managers earn higher salaries and larger bonuses, their pay-for-performance sensitivity is weaker than that of professional managers. This result is consistent with the prediction of a principal-agent model with mutual trust and job assignment. Another interesting result that emerges from our analysis is the difference in the importance of family ties with core family members and with relatives. Whereas the former are treated much more favorably than professional managers, the latter seem to enjoy little advantage over professional managers. While there could be alternative explanations, such as taste-based favoritism, succession concerns, and unobserved heterogeneity, we show that they are unlikely to be the main driving force for our results.

Overall, we provide strong evidence that family ties play an important role in shaping the internal organization of firms in China. This result may have particular relevance for understanding the performance of family firms in other developing countries where institutions are relatively weak and family firms are highly prevalent. However, we also caution that due to data limitations, we are unable to tackle all of the endogeneity issues, which awaits future data collection and research.

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APPENDIX

Theoretical Analysis of the Model

From equation (6), the manager's total payoff can be rewritten as

$$U = u + \delta\pi = (1 - \delta)\alpha + (\beta + \delta - \delta\beta)(a + bx) - \gamma x^2 - \lambda\beta^2\sigma^2. \quad (A1)$$

Maximizing the above payoff function gives the manager's optimal effort as in equation (7).

From equation (5), the firm head's total payoff can be rewritten as

$$\Pi = \pi + \delta u = -(1 - \delta)\alpha + (1 - \beta + \delta\beta)(a + bx) - \delta\gamma x^2 - \delta\lambda\beta^2\sigma^2.$$

Using equation (8), we have

$$\Pi = (1 + \delta)[a + bx - \gamma x^2 - \lambda\beta^2\sigma^2] - \bar{U}. \tag{A2}$$

Note that the expression in square brackets is simply the total revenue minus the manager's effort cost and risk cost. Using equation (7) and solving the firm head's maximization problem, we obtain the optimal incentive intensity β as expressed in equation (9). The comparative statics of β that give rise to hypotheses 1 and 2 are straightforward.

Note that

$$\begin{aligned} \delta + \beta - \delta\beta &= 1 - (1 - \delta)(1 - \beta) \\ &= 1 - \frac{4\lambda\gamma\sigma^2}{(1 - \delta)b^2 + 4\lambda\gamma\sigma^2/(1 - \delta)}. \end{aligned}$$

It is easy to check that when $(1 - \delta)^2 b^2 < 4\lambda\gamma\sigma^2$, or equivalently, when $\beta < 0.5$, then $(1 - \delta)b^2 + 4\lambda\gamma\sigma^2/(1 - \delta)$ is increasing in δ . Then $\delta + \beta - \delta\beta$, and hence the optimal effort x in equation (7), is increasing in δ .

Turning back to equation (8), we have

$$\alpha = \frac{\bar{U}}{1 - \delta} - \frac{[\delta + (1 - \delta)\beta]a}{1 - \delta} + \frac{4\lambda\gamma\sigma^2\beta^2 - (\delta + \beta - \delta\beta)^2 b^2}{4\gamma(1 - \delta)}.$$

It is hard to determine definitely whether the last two terms are increasing or decreasing in δ . However, the first term is clearly increasing in δ . When \bar{U} is sufficiently large, then α should be increasing in δ , which yields hypothesis 2.

Using equations (9) and (7), we can calculate the firm head's expected payoff in the optimal solution from equation (A2). Write this payoff as $\Pi(b, \delta)$. We now derive the properties of $\Pi(b, \delta)$. First, we write the manager's optimal effort x as a function of (β, b, δ) . It is easy to see that

$$\frac{\partial x}{\partial \beta} = \frac{(1 - \delta)b}{2\gamma} \quad \frac{\partial x}{\partial b} = \frac{\delta + \beta - \delta\beta}{2\gamma} \quad \frac{\partial x}{\partial \delta} = \frac{(1 - \beta)b}{2\gamma}.$$

From equation (A2), we have

$$\frac{d\Pi}{db} = \frac{\partial \Pi}{\partial b} + \frac{\partial \Pi}{\partial x} \frac{\partial x}{\partial b} + \frac{\partial \Pi}{\partial \beta} \frac{\partial \beta}{\partial b}.$$

By the envelope theorem, the last term equals 0. Thus,

$$\begin{aligned} \frac{d\Pi}{db} &= (1 + \delta) \left[x + (b - 2\gamma x) \frac{\partial x}{\partial b} \right] \\ &= (1 + \delta) \left[\frac{(\delta + \beta - \delta\beta)b}{2\gamma} + (1 - \delta - \beta + \delta\beta)b \frac{\delta + \beta - \delta\beta}{2\gamma} \right] \end{aligned}$$

$$\begin{aligned} &= \frac{(1 + \delta)(\delta + \beta - \delta\beta)(2 - \delta - \beta + \delta\beta)b}{2\gamma} \\ &\equiv \frac{(1 + \delta)q(2 - q)b}{2\gamma}, \end{aligned}$$

where $q \equiv \delta + \beta - \delta\beta$. We already know that q is increasing in δ .

Clearly Π is increasing in b . More important, since $q < 1$, so $q(2 - q)$ is increasing in q and hence increasing in δ . Therefore, we have

$$\frac{\partial^2 \Pi}{\partial b \partial \delta} > 0.$$

By theorem 6 of Milgrom and Shannon (1994), $\Pi(b, \delta)$ is supermodular. This means that for $b_1 > b_2$ and $\delta > 0$,

$$\Pi(b_1, \delta) + \Pi(b_2, 0) > \Pi(b_2, \delta) + \Pi(b_1, 0).$$

In other words, $\Pi^A > \Pi^B$. An intuitive way of seeing the above inequality is as follows:

$$\begin{aligned} \Pi^A - \Pi^B &= \Pi(b_1, \delta) - \Pi(b_2, \delta) - [\Pi(b_1, 0) - \Pi(b_2, 0)] \\ &= (b_1 - b_2)\partial \Pi(b, \delta)/\partial b - (b_1 - b_2)\partial \Pi(b, 0)/\partial b \\ &= (b_1 - b_2) \frac{\partial^2 \Pi}{\partial b \partial \delta} \\ &> 0. \end{aligned}$$

TABLE APPENDIX

TABLE A1.—COMPARISON BETWEEN RELATIVE AND PROFESSIONAL MANAGERS

Variables	Professional Managers (1)	Relative Managers (2)	Difference (3) = (2) - (1)
General			
Sex	0.78 (0.01)	0.77 (0.04)	-0.02 (0.04)
Age	39.06 (0.29)	37.60 (0.76)	-1.46* (0.81)
College degree dummy	0.33 (0.01)	0.21 (0.03)	-0.11*** (0.03)
Years of managerial experience	6.86 (0.18)	5.84 (0.40)	-1.02** (0.44)
Compensation and shareholding			
Total pay (RMB 10,000)	5.65 (0.44)	4.28 (0.28)	-1.36*** (0.52)
Salaries (RMB 10,000)	3.64 (0.36)	5.07 (1.72)	1.43 (1.76)
Bonuses (RMB 10,000)	1.85 (0.10)	1.62 (0.17)	-0.23 (0.20)
Percentage of shareholding	2.28 (0.20)	1.17 (0.27)	-1.11*** (0.33)
Authority			
Position level	1.12 (0.02)	1.18 (0.07)	0.06 (0.07)
Aggregate decision rights	5.06 (0.10)	4.94 (0.32)	-0.12 (0.33)
Scope of job responsibilities	1.44 (0.03)	1.40 (0.08)	-0.04 (0.09)